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Installation of Implants in the Atrophic Maxilla without the use of Bone Grafting - Systematic Review

PARAGUASSU, Éber Coelho[1]*(MSc); FIGUEIRA, Karina da Silva[1](MSc); MAIA, Claudiane da Silva do Carmo[1](Esp); MEDEIROS, Suzane de Araujo Bacelar[1](Esp); LACERDA, Jamille Passos[1](Esp); SANTOS, Alan Mesquita[2](Esp)

1-GOE/UNIA VAN; Department of Dental Sciences, Macapá , Amapá, Brazil
2-UNIVERSIDADE FEDERAL DO AMAPÁ, Department of Health Sciences

* Éber Coelho Paraguassu (Corresponding Author)
GOE/UNIA VAN; Department of Dental Sciences, Macapá , Amapá, Brazil
Avenida Padre Julio , S/N, Bairro Central, Macapá, Amapá, Brazil

***Abstract*— Objective:** *This study aims to demonstrate, through literature review in edentulous patients that present severe bone resorption of the maxilla, through alternative surgical techniques that do not require the use of bone grafts.*

Methodology : *The methodology was performed through an epidemiological survey in the main research databases and some articles with high impact factor were selected for a systematic review installation of atrophic maxillary implants without the use of bone grafting. A scan was performed in PubMed, Scielo and Capes e were found 130 articles related to the theme, 43 with bias inadequate to research and 47 with impact factor or which are much below average. These 90 articles were excluded from the review process, leaving 40 articles that were used as basis for this study.*

Results: *The feasibility of this technique became possible only with the advent of the creation of the prototypes generated from the computerized tomographies, which allow the surgical planning and the preparation of prostheses with precise fittings, made from models with dimensions and shapes identical to the area to be rehabilitated.*

***Keywords*— Atrophic maxilla, implant, computed tomography, prototyping.**

I. INTRODUCTION

The rehabilitation in patients with a high degree of maxillary alveolar resorption has been one of the major challenges of the current implant system, due to its bone topography presenting certain characteristics that can generate difficulties such as: anatomical accidents, maxillary sinuses, incisive foramen, nasal fossa and bone quality.

The treatment of choice for a long time in these cases of severe atrophy of the maxilla was the use of bone grafts, although autogenous graft was considered the first option for the reconstruction of these bone defects, obtained through extra buccal donor sites, however it has contraindications such as the high degree of morbidity of surgeries, the long period of treatment and the high monetary cost.

Due to the difficulties mentioned in the alveolar process of atrophic maxilla, the fixation of implants in other areas such as canine pillar, zygomatic process and pterygoid process, have been used with great effectiveness for the anchorage of implants for the installation of fixed total prosthesis, since such regions have excellent bone quality allowing primary stability in fixation, which gives predictability and reliability in the results.

II. METHODS

The methodology was performed through an epidemiological survey in the main research databases and some articles with high impact factor were selected for a systematic review installation of atrophic maxillary implants without the use of bone grafting. A scan was performed in PubMed, Scielo and Capes e were found 130 articles related to the theme, 43 with bias inadequate to research and 47 with impact factor or which are much below average. These 90 articles were excluded from the review process, leaving 40 articles that were used as basis for this study.

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III. SYSTEMATIC REVIEW

IMAGANTOLOGY IN IMPLANTODONTIA

In the past, according to Nevins and Mellonig (2006) dental implant treatment was dominated by surgical specialists. Based only on clinical guidelines, the well-intentioned restorative clinician could only provide limited information regarding the proposed implant regions. Because the clinical information is insufficient, the surgeon was forced to make decisions without detailed restorative guidelines, compromising the location of the implant.

The use of corrected computerized tomographic plans altered the approach of diagnosis and treatment with implants. This allowed the team of implant dentists to verify that a pre-surgically determined prosthetic plane is compatible with the maxillary and mandibular residual bone. Computerized tomography allowed visualization of the cross-sectional images of the maxilla or mandible, and these images are perpendicular to the mandible. long axis of the alveolar ridge and 95% accurate with 1 mm. The periapical radiographs are 50% accurate and the panoramic images are only 17%. Both radiographs offer no information in relation to the internal anatomy of the alveolar process or residual border (NEVINS E MELLONIG, 2003).

The lateral cephalometric radiograph provides additional information on bone quality and quantity in the premaxilla and symphysis regions of the mandible. In addition to providing important information about the spatial relationship between the jaws. However, the value of cephalometric films is limited because information about bone structure and contour is provided only for the median area of these bones and accurate information of the posterior regions can not be obtained (SPIEKERMANN et al 2008). According to Spiekermann (2008), occlusal radiography can provide information on bone quality, in addition to providing third dimension in combination with other radiographs to clarify the existence and location of residual roots, tumors, cysts, for example. In order to correctly demonstrate bone structures and to avoid incorrect interpretations, it is important that appropriate techniques are used, respecting the symmetrical positioning of the central ray and the film.

PANORAMIC

According to whaites (2003); the main drawback of this technique is that the final radiograph is a sectional radiograph. In this way, only structures within the cutting area will be evident ". Corresponding to the shape of the dental arches. Within the implantology; panoramic radiography is used as part of pre-implant planning; to obtain measurements of the alveolar bone.

According to Freitas (1998), we can observe the following structures in a panoramic radiograph: incisor teeth: pre-molar teeth: maxilla: mandible: external oblique line; internal oblique line; foramen mentale: mandibular canal: mandibular foramen; mandibular condyle: coronoid processes; styloid process; nasal cavities; nasal septum; maxillary sinuses; maxillary sinuses (posterior portion); orbit; infra-orbital foramen; zygomatic arch and pterygoid process.

Whaites (2003) cites the advantages of panoramic radiography: image information of a large area and all tissues within the focal area are presented in a single film, including anterior teeth, even when the patient is unable to open the mouth ; the image allows an easy understanding on the part of the patient, being in this way a didactic aid very useful; movements of the patient in the vertical plane only distort the parts of the image being produced at that moment; the positioning is relatively simple and a minimum of experience is required; the maxillary view allows the rapid evaluation of occult, usually asymptomatic lesions; the visualization of both sides of the mandible, in a single film and useful for the evaluation of fractures and comfortable for the traumatized patient: the overview and useful for the evaluation of the periodontal condition and the orthodontic accompaniment; the floor of the maxillary sinus and its anterior and posterior walls are well observed; both condyles are observed in a single film, thus allowing an easy comparison; the dose of radiation (effective dose) and approximately 1/3 of the use for intraoral mouth-whole examination and the development of partial panoramic techniques with resulting decrease in dose exposure.

The disadvantages, according to Whaites (2003), with respect to the panoramic radiographs are: the image presented only a section of the patient, structures or abnormalities which are not in the focal area may not be evident; images of soft tissues and air may overlap important hard tissue structures; ghost or artefactual images can overlap structures that are within the focal area; the movement of the apparatus in conjunction with the distance between the focal area and the film produces distortion and enlargement of the final image; the use of indirect action films and intensifying plates result in some loss of image quality: the technique is not suitable for children under five years of age or for patients with some deficiency; due to the duration of the exposure cycle and the shape of the focal area does not adhere to the dental arches, causing some structures to appear out of focus.

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COMPUTERIZED TOMOGRAPHY

Computed tomography and a specialized technique to produce radiographs showing only a section or section of the patient. (PARAGUASSU et al., 2019)

On computed tomography the X-ray tube mounted on a GANTRY rotates through a track emitting a very thin x-ray beam. These rays are carefully collimated in such a way that they collide only in one section of the body, but under a large number of angles of this section (CASATI and TAVANO, 1998). According to CASATI and TAVANO, since body tissues are composed of different elements, they have different types of absorption and attenuation of X-rays, which will affect the detectors or radiation sensors rather than on a film of radiography The detector's response is to give rise to an electrical signal, which is directly proportional to the number of photons that are incident on it. These signals can be quantified and recorded on a computer that will draw a drawing (tomographic image) formed by multiple points (PIXELS) in a wide range of shades of gray. CT scans should be used to represent the most important structures of the facial skull, being the technique of first choice PARAGUASSU et al., (2019), tomographic images sectioned as main indications clinicam, according to whaites (2003) in implantology: evaluation of the height, thickness and texture of the jaws before implant placement and postoperative evaluation of implants. It is also possible, according to Casati and Tavano (1998), to perform, through computed tomography, an evaluation of the extent and integrity of bone cortices, as well as their relationships with anatomical structures such as vascular-nervous bundles, for the planning of osseointegrated implants.

The visualization of the radiographic anatomy by computed tomography, according to Freitas (1998), and simplified by the numerous cuts that facilitate the localization of anatomical structures bony and soft tissues concomitantly.

According to Van Steenberghe (2003) the computerized tomography gives the opportunity to visualize the health of the maxilla and the maxillary sinus; sinusitis, polyps or any pathology may be excluded. The zygoma density, length, and volume can be evaluated and special guides for the insertion of the zygomatic implants can be made prototypes (stereolithographic models) to facilitate the orientation of the zygomatic implants during surgery, with minimal errors in angulation and position.

In the jaws we can analyze structures such as: mental foramen: mandible body; region; carotid; floorboards; jugular; submandibular gland (oropharynx); parotid gland; language; asacedent branch; mandibular angle; mandibular canal; masseter muscle; lateral pterygoid muscle; palate; sphenoidal sinus; sphenoid process; posterior part of the joint cavity; frontal sinus; ethmoidal sinuses; nasal septum; fossanasal; maxillary sinus; anterior nasal spine; mastoid process of the temporal bone; foramen magnum; zygomatic arch; articular cavity and condyle of the mandible. The advantages of performing a CT scan and that one can obtain an optimal definition in each cut. However, the dose of radiation to the patient may be high, the technique requires a lot of time to be performed and a high level of patient cooperation is required, since the patient needs to be in a single position throughout the examination (WHAITES, 2003).

IV. CONCLUSION

Through a brief literature review we conclude that:

- Imaging resources such as computed tomography and prototyping are of great importance in rehabilitation planning, since they allow an accurate visualization of the regions to be rehabilitated, besides the preparation of surgical guides and the execution of previous surgeries.
- Rehabilitation through autogenous bone grafts are established techniques, but they have a high degree of morbidity, require a time and cost of treatment and do not allow the patient to use a prosthesis during the initial healing phase, thus making it impossible to satisfy immediately.
- Rehabilitating techniques for severely atrophic maxillaries, which do not require a bone graft, using implants such as zygomatic fixation, have been developed to rehabilitate the patient in a shorter time of cost of treatment and mainly lower morbidity and proportionally still immediate patient satisfaction.

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